

09/719379

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SEQUENCE LISTING

<110> Joe Cohen
Yves Lobet
Guy Dequesne
Lauren Bakalatz

<120> Vaccine

<130> B45145

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Asp Leu Gly Glu
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gaa 63

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caccattaat ctagaatcga taagcttcga ccgatgcc

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Met Asp Pro Lys Thr Leu Ala Leu Ser Leu Leu Ala Ala Gly
1 5 10

60

108

gta cta gca ggt tgt agc agc cat tca tca aat atg gcg aat acc caa
Val Leu Ala Gly Cys Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln
15 20 25 30

156

atg aaa tca gac aaa atc att att gct cac cgt ggt gct agc ggt tat
Met Lys Ser Asp Lys Ile Ile Ala His Arg Gly Ala Ser Gly Tyr
35 40 45

204

tta cca gag cat acg tta gaa tct aaa gca ctt gcg ttt gca caa cag
Leu Pro Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln
50 55 60

252

gct gat tat tta gag caa gat tta gca atg act aag gat ggt cgt tta
Ala Asp Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu
65 70 75

300

gtg gtt att cac gat cac ttt tta gat ggc ttg act gat gtt gcg aaa
Val Val Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys
80 85 90

348

aaa ttc cca cat cgt cat cgt aaa gat ggc cgt tac tat gtc atc gac
Lys Phe Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp
95 100 105 110

396

ttt acc tta aaa gaa att caa agt tta gaa atg aca gaa aac ttt gaa
Phe Thr Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu

444

115

120

125

acc aaa gat ggc aaa caa gcg caa gtt tat cct aat cgt ttc cct ctt			492
Thr Lys Asp Gly Lys Gln Ala Gln Val Tyr Pro Asn Arg Phe Pro Leu			
130	135	140	
tgg aaa tca cat ttt aga att cat acc ttt gaa gat gaa att gaa ttt			540
Trp Lys Ser His Phe Arg Ile His Thr Phe Glu Asp Glu Ile Glu Phe			
145	150	155	
atc caa ggc tta gaa aaa tcc act ggc aaa aaa gta ggg att tat cca			588
Ile Gln Gly Leu Glu Lys Ser Thr Gly Lys Lys Val Gly Ile Tyr Pro			
160	165	170	
gaa atc aaa gca cct tgg ttc cac cat caa aat ggt aaa gat att gct			636
Glu Ile Lys Ala Pro Trp Phe His His Gln Asn Gly Lys Asp Ile Ala			
175	180	185	190
gct gaa acg ctc aaa gtg tta aaa aaa tat ggc tat gat aag aaa acc			684
Ala Glu Thr Leu Lys Val Leu Lys Lys Tyr Gly Tyr Asp Lys Lys Thr			
195	200	205	
gat atg gtt tac tta caa act ttc gat ttt aat gaa tta aaa cgt atc			732
Asp Met Val Tyr Leu Gln Thr Phe Asp Phe Asn Glu Leu Lys Arg Ile			
210	215	220	
aaa acg gaa tta ctt cca caa atg gga atg gat ttg aaa tta gtt caa			780
Lys Thr Glu Leu Leu Pro Gln Met Gly Met Asp Leu Lys Leu Val Gln			
225	230	235	
tta att gct tat aca gat tgg aaa gaa aca caa gaa aaa gac cca aag			828
Leu Ile Ala Tyr Thr Asp Trp Lys Glu Thr Gln Glu Lys Asp Pro Lys			
240	245	250	
ggt tat tgg gta aac tat aat tac gat tgg atg ttt aaa cct ggt gca			876
Gly Tyr Trp Val Asn Tyr Asn Tyr Asp Trp Met Phe Lys Pro Gly Ala			
255	260	265	270
atg gca gaa gtg gtt aaa tat gcc gat ggt gtt ggc cca ggt tgg tat			924
Met Ala Glu Val Val Lys Tyr Ala Asp Gly Val Gly Pro Gly Trp Tyr			
275	280	285	
atg tta gtt aat aaa gaa gaa tcc aaa cct gat aat att gtg tac act			972
Met Leu Val Asn Lys Glu Glu Ser Lys Pro Asp Asn Ile Val Tyr Thr			
290	295	300	
ccg ttg gta aaa gaa ctt gca caa tat aat gtg gaa gtg cat cct tac			1020
Pro Leu Val Lys Glu Leu Ala Gln Tyr Asn Val Glu Val His Pro Tyr			
305	310	315	
acc gtg cgt aaa gat gca ctg ccc gag ttt ttc aca gac gta aat caa			1068
Thr Val Arg Lys Asp Ala Leu Pro Glu Phe Phe Thr Asp Val Asn Gln			
320	325	330	
atg tat gat gcc tta ttg aat aaa tca ggg gca aca ggt gta ttt act			1116
Met Tyr Asp Ala Leu Leu Asn Lys Ser Gly Ala Thr Gly Val Phe Thr			
335	340	345	350
gat ttc cca gat act ggc gtg gaa ttc tta aaa gga ata aaa tcc atg			1164
Asp Phe Pro Asp Thr Gly Val Glu Phe Leu Lys Gly Ile Lys Ser Met			
355	360	365	

gcc acg tgt gat cag agc tca act agt ggc cac cat cac cat cac cat
Ala Thr Cys Asp Gln Ser Ser Thr Ser Gly His His His His His His
370 375 380

1212

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<211> 382

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<213> Haemophilus influenzae - see Figure 2

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Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
35 40 45
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
50 55 60
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
65 70 75 80
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
85 90 95
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
100 105 110
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Lys
115 120 125
Asp Gly Lys Gln Ala Gln Val Tyr Pro Asn Arg Phe Pro Leu Trp Lys
130 135 140
Ser His Phe Arg Ile His Thr Phe Glu Asp Glu Ile Glu Phe Ile Gln
145 150 155 160
Gly Leu Glu Lys Ser Thr Gly Lys Lys Val Gly Ile Tyr Pro Glu Ile
165 170 175
Lys Ala Pro Trp Phe His His Gln Asn Gly Lys Asp Ile Ala Ala Glu
180 185 190
Thr Leu Lys Val Leu Lys Tyr Gly Tyr Asp Lys Lys Thr Asp Met
195 200 205
Val Tyr Leu Gln Thr Phe Asp Phe Asn Glu Leu Lys Arg Ile Lys Thr
210 215 220
Glu Leu Leu Pro Gln Met Gly Met Asp Leu Lys Leu Val Gln Leu Ile
225 230 235 240
Ala Tyr Thr Asp Trp Lys Glu Thr Gln Glu Lys Asp Pro Lys Gly Tyr
245 250 255
Trp Val Asn Tyr Asn Tyr Asp Trp Met Phe Lys Pro Gly Ala Met Ala
260 265 270
Glu Val Val Lys Tyr Ala Asp Gly Val Gly Pro Gly Trp Tyr Met Leu
275 280 285
Val Asn Lys Glu Glu Ser Lys Pro Asp Asn Ile Val Tyr Thr Pro Leu
290 295 300
Val Lys Glu Leu Ala Gln Tyr Asn Val Glu Val His Pro Tyr Thr Val
305 310 315 320
Arg Lys Asp Ala Leu Pro Glu Phe Phe Thr Asp Val Asn Gln Met Tyr
325 330 335
Asp Ala Leu Leu Asn Lys Ser Gly Ala Thr Gly Val Phe Thr Asp Phe
340 345 350
Pro Asp Thr Gly Val Glu Phe Leu Lys Gly Ile Lys Ser Met Ala Thr
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Cys Asp Gln Ser Ser Thr Ser Gly His His His His His His His
370 375 380

<210> 76
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Met Asp Pro Lys Thr Leu Ala Leu Ser Leu Leu Ala Ala Gly	
1 5 10	
gta cta gca ggt tgt agc agc cat tca tca aat atg gcg aat acc caa	156
Val Leu Ala Gly Cys Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln	
15 20 25 30	
atg aaa tca gac aaa atc att att gct cac cgt ggt gct agc ggt tat	204
Met Lys Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr	
35 40 45	
tta cca gag cat acg tta gaa tct aaa gca ctt gcg ttt gca caa cag	252
Leu Pro Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln	
50 55 60	
gct gat tat tta gag caa gat tta gca atg act aag gat ggt cgt tta	300
Ala Asp Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu	
65 70 75	
gtg gtt att cac gat cac ttt tta gat ggc ttg act gat gtt gcg aaa	348
Val Val Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys	
80 85 90	
aaa ttc cca cat cgt cat cgt aaa gat ggc cgt tac tat gtc atc gac	396
Lys Phe Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp	
95 100 105 110	
ttt acc tta aaa gaa att caa agt tta gaa atg aca gaa aac ttt gaa	444
Phe Thr Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu	
115 120 125	
acc aaa gat ggc aaa caa gcg caa gtt tat cct aat cgt ttc cct ctt	492
Thr Lys Asp Gly Lys Gln Ala Gln Val Tyr Pro Asn Arg Phe Pro Leu	
130 135 140	
tgg aaa tca cat ttt aga att cat acc ttt gaa gat gaa att gaa ttt	540
Trp Lys Ser His Phe Arg Ile His Thr Phe Glu Asp Glu Ile Glu Phe	
145 150 155	
atc caa ggc tta gaa aaa tcc act ggc aaa aaa gta ggg att tat cca	588
Ile Gln Gly Leu Glu Lys Ser Thr Gly Lys Lys Val Gly Ile Tyr Pro	
160 165 170	
gaa atc aaa gca cct tgg ttc cac cat caa aat ggt aaa gat att gct	636
Glu Ile Lys Ala Pro Trp Phe His His Gln Asn Gly Lys Asp Ile Ala	
175 180 185 190	
gct gaa acg ctc aaa gtg tta aaa aaa tat ggc tat gat aag aaa acc	684

Ala Glu Thr Leu Lys Val Leu Lys Tyr Gly Tyr Asp Lys Lys Thr			
195	200	205	
gat atg gtt tac tta caa act ttc gat ttt aat gaa tta aaa cgt atc		732	
Asp Met Val Tyr Leu Gln Thr Phe Asp Phe Asn Glu Leu Lys Arg Ile			
210	215	220	
aaa acg gaa tta ctt cca caa atg gga atg gat ttg aaa tta gtt caa		780	
Lys Thr Glu Leu Leu Pro Gln Met Gly Met Asp Leu Lys Leu Val Gln			
225	230	235	
tta att gct tat aca gat tgg aaa gaa aca caa gaa aaa gac cca aag		828	
Leu Ile Ala Tyr Thr Asp Trp Lys Glu Thr Gln Glu Lys Asp Pro Lys			
240	245	250	
ggg tat tgg gta aac tat aat tac gat tgg atg ttt aaa cct ggt gca		876	
Gly Tyr Trp Val Asn Tyr Asn Tyr Asp Trp Met Phe Lys Pro Gly Ala			
255	260	265	270
atg gca gaa gtg gtt aaa tat gcc gat ggt gtt ggc cca ggt tgg tat		924	
Met Ala Glu Val Val Lys Tyr Ala Asp Gly Val Gly Pro Gly Trp Tyr			
275	280	285	
atg tta gtt aat aaa gaa gaa tcc aaa cct gat aat att gtg tac act		972	
Met Leu Val Asn Lys Glu Glu Ser Lys Pro Asp Asn Ile Val Tyr Thr			
290	295	300	
ccg ttg gta aaa gaa ctt gca caa tat aat gtg gaa gtg cat cct tac		1020	
Pro Leu Val Lys Glu Leu Ala Gln Tyr Asn Val Glu Val His Pro Tyr			
305	310	315	
acc gtg cgt aaa gat gca ctg ccc gag ttt ttc aca gac gta aat caa		1068	
Thr Val Arg Lys Asp Ala Leu Pro Glu Phe Phe Thr Asp Val Asn Gln			
320	325	330	
atg tat gat gcc tta ttg aat aaa tca ggg gca aca ggt gta ttt act		1116	
Met Tyr Asp Ala Leu Leu Asn Ser Gly Ala Thr Gly Val Phe Thr			
335	340	345	350
gat ttc cca gat act ggc gtg gaa ttc tta aaa gga ata aaa tcc atg		1164	
Asp Phe Pro Asp Thr Gly Val Glu Phe Leu Lys Gly Ile Lys Ser Met			
355	360	365	
gat ggt ggc aaa gca ggt gtt gct tta gta cgt tct gat tat aaa ttt		1212	
Asp Gly Gly Lys Ala Gly Val Ala Leu Val Arg Ser Asp Tyr Lys Phe			
370	375	380	
tat gaa gat gca aac ggt act cgt gac cac aag aaa ggt cgt cac aca		1260	
Tyr Glu Asp Ala Asn Gly Thr Arg Asp His Lys Lys Gly Arg His Thr			
385	390	395	
gca cgt act agt ggc cac cat cac cat cac cat taatctagaa tcgataagct		1313	
Ala Arg Thr Ser Gly His His His His His His			
400	405		
tcgaccgatg cc		1325	
<210> 77			
<211> 409			
<212> PRT			
<213> Haemophilus influenzae - see Figure 3			

<400> 77

Met Asp Pro Lys Thr Leu Ala Leu Ser Leu Leu Ala Ala Gly Val Leu
1 5 10 15
Ala Gly Cys Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
20 25 30
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
35 40 45
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
50 55 60
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
65 70 75 80
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
85 90 95
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
100 105 110
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Lys
115 120 125
Asp Gly Lys Gln Ala Gln Val Tyr Pro Asn Arg Phe Pro Leu Trp Lys
130 135 140
Ser His Phe Arg Ile His Thr Phe Glu Asp Glu Ile Glu Phe Ile Gln
145 150 155 160
Gly Leu Glu Lys Ser Thr Gly Lys Lys Val Gly Ile Tyr Pro Glu Ile
165 170 175
Lys Ala Pro Trp Phe His His Gln Asn Gly Lys Asp Ile Ala Ala Glu
180 185 190
Thr Leu Lys Val Leu Lys Lys Tyr Gly Tyr Asp Lys Lys Thr Asp Met
195 200 205
Val Tyr Leu Gln Thr Phe Asp Phe Asn Glu Leu Lys Arg Ile Lys Thr
210 215 220
Glu Leu Leu Pro Gln Met Gly Met Asp Leu Lys Leu Val Gln Leu Ile
225 230 235 240
Ala Tyr Thr Asp Trp Lys Glu Thr Gln Glu Lys Asp Pro Lys Gly Tyr
245 250 255
Trp Val Asn Tyr Asn Tyr Asp Trp Met Phe Lys Pro Gly Ala Met Ala
260 265 270
Glu Val Val Lys Tyr Ala Asp Gly Val Gly Pro Gly Trp Tyr Met Leu
275 280 285
Val Asn Lys Glu Glu Ser Lys Pro Asp Asn Ile Val Tyr Thr Pro Leu
290 295 300
Val Lys Glu Leu Ala Gln Tyr Asn Val Glu Val His Pro Tyr Thr Val
305 310 315 320
Arg Lys Asp Ala Leu Pro Glu Phe Phe Thr Asp Val Asn Gln Met Tyr
325 330 335
Asp Ala Leu Leu Asn Lys Ser Gly Ala Thr Gly Val Phe Thr Asp Phe
340 345 350
Pro Asp Thr Gly Val Glu Phe Leu Lys Gly Ile Lys Ser Met Asp Gly
355 360 365
Gly Lys Ala Gly Val Ala Leu Val Arg Ser Asp Tyr Lys Phe Tyr Glu
370 375 380
Asp Ala Asn Gly Thr Arg Asp His Lys Lys Gly Arg His Thr Ala Arg
385 390 395 400
Thr Ser Gly His His His His His His
405

<210> 78

<211> 1442

<212> DNA

<213> Haemophilus influenzae - see Figure 4

<220>

<221> CDS
<222> (67) ... (1411)

<400> 78

ctcttacaca ttccagccct gaaaaagggc atcaaattaa accacaccctt aaggaggata	60
taacat atg gat cca aaa act tta gcc ctt tct tta gca gct ggc	108
Met Asp Pro Lys Thr Leu Ala Leu Ser Leu Leu Ala Ala Gly	
1 5 10	
gta cta gca ggt tgt agc agc cat tca tca aat atg gcg aat acc caa	156
Val Leu Ala Gly Cys Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln	
15 20 25 30	
atg aaa tca gac aaa atc att att gct cac cgt ggt gct agc ggt tat	204
Met Lys Ser Asp Lys Ile Ile Ala His Arg Gly Ala Ser Gly Tyr	
35 40 45	
tta cca gag cat acg tta gaa tct aaa gca ctt gcg ttt gca caa cag	252
Leu Pro Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln	
50 55 60	
gct gat tat tta gag caa gat tta gca atg act aag gat ggt cgt tta	300
Ala Asp Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu	
65 70 75	
gtg gtt att cac gat cac ttt tta gat ggc ttg act gat gtt gcg aaa	348
Val Val Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys	
80 85 90	
aaa ttc cca cat cgt cat cgt aaa gat ggc cgt tac tat gtc atc gac	396
Lys Phe Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp	
95 100 105 110	
ttt acc tta aaa gaa att caa agt tta gaa atg aca gaa aac ttt gaa	444
Phe Thr Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu	
115 120 125	
acc aaa gat ggc aaa caa gcg caa gtt tat cct aat cgt ttc cct ctt	492
Thr Lys Asp Gly Lys Gln Ala Gln Val Tyr Pro Asn Arg Phe Pro Leu	
130 135 140	
tgg aaa tca cat ttt aga att cat acc ttt gaa gat gaa att gaa ttt	540
Trp Lys Ser His Phe Arg Ile His Thr Phe Glu Asp Glu Ile Glu Phe	
145 150 155	
atc caa ggc tta gaa aaa tcc act ggc aaa aaa gta ggg att tat cca	588
Ile Gln Gly Leu Glu Lys Ser Thr Gly Lys Lys Val Gly Ile Tyr Pro	
160 165 170	
gaa atc aaa gca cct tgg ttc cac cat caa aat ggt aaa gat att gct	636
Glu Ile Lys Ala Pro Trp Phe His His Gln Asn Gly Lys Asp Ile Ala	
175 180 185 190	
gct gaa acg ctc aaa gtg tta aaa aaa tat ggc tat gat aag aaa acc	684
Ala Glu Thr Leu Lys Val Leu Lys Lys Tyr Gly Tyr Asp Lys Lys Thr	
195 200 205	
gat atg gtt tac tta caa act ttc gat ttt aat gaa tta aaa cgt atc	732
Asp Met Val Tyr Leu Gln Thr Phe Asp Phe Asn Glu Leu Lys Arg Ile	
210 215 220	

aaa acg gaa tta ctt cca caa atg gga atg gat ttg aaa tta gtt caa Lys Thr Glu Leu Leu Pro Gln Met Gly Met Asp Leu Lys Leu Val Gln 225 230 235	780
tta att gct tat aca gat tgg aaa gaa aca caa gaa aaa gac cca aag Leu Ile Ala Tyr Thr Asp Trp Lys Glu Thr Gln Glu Lys Asp Pro Lys 240 245 250	828
ggt tat tgg gta aac tat aat tac gat tgg atg ttt aaa cct ggt gca Gly Tyr Trp Val Asn Tyr Asn Tyr Asp Trp Met Phe Lys Pro Gly Ala 255 260 265 270	876
atg gca gaa gtg gtt aaa tat gcc gat ggt gtt ggc cca ggt tgg tat Met Ala Glu Val Val Lys Tyr Ala Asp Gly Val Gly Pro Gly Trp Tyr 275 280 285	924
atg tta gtt aat aaa gaa gaa tcc aaa cct gat aat att gtg tac act Met Leu Val Asn Lys Glu Glu Ser Lys Pro Asp Asn Ile Val Tyr Thr 290 295 300	972
ccg ttg gta aaa gaa ctt gca caa tat aat gtg gaa gtg cat cct tac Pro Leu Val Lys Glu Leu Ala Gln Tyr Asn Val Glu Val His Pro Tyr 305 310 315	1020
acc gtg cgt aaa gat gca ctg ccc gag ttt ttc aca gac gta aat caa Thr Val Arg Lys Asp Ala Leu Pro Glu Phe Phe Thr Asp Val Asn Gln 320 325 330	1068
atg tat gat gcc tta ttg aat aaa tca ggg gca aca ggt gta ttt act Met Tyr Asp Ala Leu Leu Asn Lys Ser Gly Ala Thr Gly Val Phe Thr 335 340 345 350	1116
gat ttc cca gat act ggc gtg gaa ttc tta aaa gga ata aaa tcc atg Asp Phe Pro Asp Thr Gly Val Glu Phe Leu Lys Gly Ile Lys Ser Met 355 360 365	1164
gat ggc ggt aaa gca ggt gtt gct tta gtt cgt tct gac tat aaa ttg Asp Gly Gly Lys Ala Gly Val Ala Leu Val Arg Ser Asp Tyr Lys Leu 370 375 380	1212
tac aat aaa aat agt agt aat agt act ctt aaa aac cta ggc gaa Tyr Asn Lys Asn Ser Ser Asn Ser Thr Leu Lys Asn Leu Gly Glu 385 390 395	1260
cat cac aga gca cgt gcc atg gat ggt ggc aaa gca ggt gtt gct tta His His Arg Ala Arg Ala Met Asp Gly Gly Lys Ala Gly Val Ala Leu 400 405 410	1308
gta cgt tct gat tat aaa ttt tat gaa gat gca aac ggt act cgt gac Val Arg Ser Asp Tyr Lys Phe Tyr Glu Asp Ala Asn Gly Thr Arg Asp 415 420 425 430	1356
cac aag aaa ggt cgt cac aca gca cgt act agt ggc cac cat cac cat His Lys Lys Gly Arg His Thr Ala Arg Thr Ser Gly His His His His 435 440 445	1404
cac cat t aatctagaat cgataagctt cgaccgatgc c His His	1442

<210> 79
<211> 448
<212> PRT

<213> Haemophilus influenzae - see Figure 4

<400> 79

Met Asp Pro Lys Thr Leu Ala Leu Ser Leu Leu Ala Ala Gly Val Leu
1 5 10 15
Ala Gly Cys Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
20 25 30
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
35 40 45
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
50 55 60
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
65 70 75 80
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
85 90 95
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
100 105 110
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Lys
115 120 125
Asp Gly Lys Gln Ala Gln Val Tyr Pro Asn Arg Phe Pro Leu Trp Lys
130 135 140
Ser His Phe Arg Ile His Thr Phe Glu Asp Glu Ile Glu Phe Ile Gln
145 150 155 160
Gly Leu Glu Lys Ser Thr Gly Lys Lys Val Gly Ile Tyr Pro Glu Ile
165 170 175
Lys Ala Pro Trp Phe His His Gln Asn Gly Lys Asp Ile Ala Ala Glu
180 185 190
Thr Leu Lys Val Leu Lys Lys Tyr Gly Tyr Asp Lys Lys Thr Asp Met
195 200 205
Val Tyr Leu Gln Thr Phe Asp Phe Asn Glu Leu Lys Arg Ile Lys Thr
210 215 220
Glu Leu Leu Pro Gln Met Gly Met Asp Leu Lys Leu Val Gln Leu Ile
225 230 235 240
Ala Tyr Thr Asp Trp Lys Glu Thr Gln Glu Lys Asp Pro Lys Gly Tyr
245 250 255
Trp Val Asn Tyr Asn Tyr Asp Trp Met Phe Lys Pro Gly Ala Met Ala
260 265 270
Glu Val Val Lys Tyr Ala Asp Gly Val Gly Pro Gly Trp Tyr Met Leu
275 280 285
Val Asn Lys Glu Glu Ser Lys Pro Asp Asn Ile Val Tyr Thr Pro Leu
290 295 300
Val Lys Glu Leu Ala Gln Tyr Asn Val Glu Val His Pro Tyr Thr Val
305 310 315 320
Arg Lys Asp Ala Leu Pro Glu Phe Phe Thr Asp Val Asn Gln Met Tyr
325 330 335
Asp Ala Leu Leu Asn Lys Ser Gly Ala Thr Gly Val Phe Thr Asp Phe
340 345 350
Pro Asp Thr Gly Val Glu Phe Leu Lys Gly Ile Lys Ser Met Asp Gly
355 360 365
Gly Lys Ala Gly Val Ala Leu Val Arg Ser Asp Tyr Lys Leu Tyr Asn
370 375 380
Lys Asn Ser Ser Asn Ser Thr Leu Lys Asn Leu Gly Glu His His
385 390 395 400
Arg Ala Arg Ala Met Asp Gly Gly Lys Ala Gly Val Ala Leu Val Arg
405 410 415
Ser Asp Tyr Lys Phe Tyr Glu Asp Ala Asn Gly Thr Arg Asp His Lys
420 425 430
Lys Gly Arg His Thr Ala Arg Thr Ser Gly His His His His His

435

440

445

<210> 80
 <211> 1490
 <212> DNA
 <213> *Haemophilus influenzae* - see Figure 5

<220>
 <221> CDS
 <222> (67) ... (1458)

<400> 80

ctcttacaca	ttccagccct	aaaaagggc	atcaaattaa	accacaccc	aaggaggata	60
taacat	atg	gat	cca	aaa	act	60
	tta	gcc	ttt	tct	tta	108
	Met	Asp	Pro	Lys	Thr	
	1	5	10			
gta	cta	gca	ggt	tgt	agc	156
Val	Leu	Ala	Gly	Cys	Ser	
15	20	25	30			
atg	aaa	tca	gac	aaa	atc	204
Met	Lys	Ser	Asp	Lys	Ile	
	35	40	45			
tta	cca	gag	cat	acg	tta	252
Leu	Pro	Glu	His	Thr	Leu	
50	55	60				
gct	gat	tat	tta	gag	caa	300
Ala	Asp	Tyr	Leu	Glu	Gln	
65	70	75				
gtg	gtt	att	cac	gat	cac	348
Val	Val	Ile	His	Asp	His	
80	85	90				
aaa	ttc	cca	cat	cgt	cat	396
Lys	Phe	Pro	His	Arg	His	
95	100	105	110			
ttt	acc	tta	aaa	gaa	att	444
Phe	Thr	Leu	Lys	Glu	Ile	
115	120	125				
acc	aaa	gat	ggc	aaa	caa	492
Thr	Lys	Asp	Gly	Lys	Gln	
130	135	140				
tgg	aaa	tca	cat	ttt	aga	540
Trp	Lys	Ser	His	Phe	Arg	
145	150	155				
atc	caa	ggc	tta	gaa	aaa	588
Ile	Gln	Gly	Leu	Glu	Lys	
160	165	170				
gaa	atc	aaa	gca	cct	tgg	636
Glu	Ile	Lys	Ala	Pro	Trp	
175	180	185	190			

gct gaa acg ctc aaa gtg tta aaa aaa tat ggc tat gat aag aaa acc	684
Ala Glu Thr Leu Lys Val Leu Lys Tyr Gly Tyr Asp Lys Lys Thr	
195 200 205	
gat atg gtt tac tta caa act ttc gat ttt aat gaa tta aaa cgt atc	732
Asp Met Val Tyr Leu Gln Thr Phe Asp Phe Asn Glu Leu Lys Arg Ile	
210 215 220	
aaa acg gaa tta ctt cca caa atg gga atg gat ttg aaa tta gtt caa	780
Lys Thr Glu Leu Leu Pro Gln Met Gly Met Asp Leu Lys Leu Val Gln	
225 230 235	
tta att gct tat aca gat tgg aaa gaa aca caa gaa aaa gac cca aag	828
Leu Ile Ala Tyr Thr Asp Trp Lys Glu Thr Gln Glu Lys Asp Pro Lys	
240 245 250	
ggt tat tgg gta aac tat aat tac gat tgg atg ttt aaa cct ggt gca	876
Gly Tyr Trp Val Asn Tyr Asn Tyr Asp Trp Met Phe Lys Pro Gly Ala	
255 260 265 270	
atg gca gaa gtg gtt aaa tat gcc gat ggt gtt ggc cca ggt tgg tat	924
Met Ala Glu Val Val Lys Tyr Ala Asp Gly Val Gly Pro Gly Trp Tyr	
275 280 285	
atg tta gtt aat aaa gaa gaa tcc aaa cct gat aat att gtg tac act	972
Met Leu Val Asn Lys Glu Glu Ser Lys Pro Asp Asn Ile Val Tyr Thr	
290 295 300	
ccg ttg gta aaa gaa ctt gca caa tat aat gtg gaa gtg cat cct tac	1020
Pro Leu Val Lys Glu Leu Ala Gln Tyr Asn Val Glu Val His Pro Tyr	
305 310 315	
acc gtg cgt aaa gat gca ctg ccc gag ttt ttc aca gac gta aat caa	1068
Thr Val Arg Lys Asp Ala Leu Pro Glu Phe Phe Thr Asp Val Asn Gln	
320 325 330	
atg tat gat gcc tta ttg aat aaa tca ggg gca aca ggt gta ttt act	1116
Met Tyr Asp Ala Leu Leu Asn Ser Gly Ala Thr Gly Val Phe Thr	
335 340 345 350	
gat ttc cca gat act ggc gtg gaa ttc tta aaa gga ata aaa tcc atg	1164
Asp Phe Pro Asp Thr Gly Val Glu Phe Leu Lys Gly Ile Lys Ser Met	
355 360 365	
gat ggc ggt aaa gca ggt gtt gct tta gtt cgt tct gac tat aaa ttg	1212
Asp Gly Gly Lys Ala Gly Val Ala Leu Val Arg Ser Asp Tyr Lys Leu	
370 375 380	
tac aat aaa aat agt agt aat agt act ctt aaa aac cta ggc gaa	1260
Tyr Asn Lys Asn Ser Ser Asn Ser Thr Leu Lys Asn Leu Gly Glu	
385 390 395	
cat cac aga gca cgt gcc atg gat ggt ggc aaa gca ggt gtt gct tta	1308
His His Arg Ala Arg Ala Met Asp Gly Gly Lys Ala Gly Val Ala Leu	
400 405 410	
gta cgt tct gat tat aaa ttt tat gaa gat gca aac ggt act cgt gac	1356
Val Arg Ser Asp Tyr Lys Phe Tyr Glu Asp Ala Asn Gly Thr Arg Asp	
415 420 425 430	
. cac aag aaa ggt cgt cac aca gca cgt act agt cgt tct gac tat aaa	1404

His Lys Lys Gly Arg His Thr Ala Arg Thr Ser Arg Ser Asp Tyr Lys
435 440 445

ttc tac gat aat aaa cgc atc gat agt act agt ggc cac cat cac cat 1452
Phe Tyr Asp Asn Lys Arg Ile Asp Ser Thr Ser Gly His His His His
450 455 460

cac cat taatctagaa tcgataagct tcgaccgatg cc 1490
His His

<210> 81

<211> 464

<212> PRT

<213> Haemophilus influenzae - see Figure 5

<400> 81

Met Asp Pro Lys Thr Leu Ala Leu Ser Leu Leu Ala Ala Gly Val Leu
1 5 10 15
Ala Gly Cys Ser Ser His Ser Ser Asn Met Ala Asn Thr Gln Met Lys
20 25 30
Ser Asp Lys Ile Ile Ile Ala His Arg Gly Ala Ser Gly Tyr Leu Pro
35 40 45
Glu His Thr Leu Glu Ser Lys Ala Leu Ala Phe Ala Gln Gln Ala Asp
50 55 60
Tyr Leu Glu Gln Asp Leu Ala Met Thr Lys Asp Gly Arg Leu Val Val
65 70 75 80
Ile His Asp His Phe Leu Asp Gly Leu Thr Asp Val Ala Lys Lys Phe
85 90 95
Pro His Arg His Arg Lys Asp Gly Arg Tyr Tyr Val Ile Asp Phe Thr
100 105 110
Leu Lys Glu Ile Gln Ser Leu Glu Met Thr Glu Asn Phe Glu Thr Lys
115 120 125
Asp Gly Lys Gln Ala Gln Val Tyr Pro Asn Arg Phe Pro Leu Trp Lys
130 135 140
Ser His Phe Arg Ile His Thr Phe Glu Asp Glu Ile Glu Phe Ile Gln
145 150 155 160
Gly Leu Glu Lys Ser Thr Gly Lys Lys Val Gly Ile Tyr Pro Glu Ile
165 170 175
Lys Ala Pro Trp Phe His His Gln Asn Gly Lys Asp Ile Ala Ala Glu
180 185 190
Thr Leu Lys Val Leu Lys Lys Tyr Gly Tyr Asp Lys Lys Thr Asp Met
195 200 205
Val Tyr Leu Gln Thr Phe Asp Phe Asn Glu Leu Lys Arg Ile Lys Thr
210 215 220
Glu Leu Leu Pro Gln Met Gly Met Asp Leu Lys Leu Val Gln Leu Ile
225 230 235 240
Ala Tyr Thr Asp Trp Lys Glu Thr Gln Glu Lys Asp Pro Lys Gly Tyr
245 250 255
Trp Val Asn Tyr Asn Tyr Asp Trp Met Phe Lys Pro Gly Ala Met Ala
260 265 270
Glu Val Val Lys Tyr Ala Asp Gly Val Gly Pro Gly Trp Tyr Met Leu
275 280 285
Val Asn Lys Glu Glu Ser Lys Pro Asp Asn Ile Val Tyr Thr Pro Leu
290 295 300
Val Lys Glu Leu Ala Gln Tyr Asn Val Glu Val His Pro Tyr Thr Val
305 310 315 320
Arg Lys Asp Ala Leu Pro Glu Phe Phe Thr Asp Val Asn Gln Met Tyr
325 330 335
Asp Ala Leu Leu Asn Lys Ser Gly Ala Thr Gly Val Phe Thr Asp Phe

340 345 350
Pro Asp Thr Gly Val Glu Phe Leu Lys Gly Ile Lys Ser Met Asp Gly
355 360 365
Gly Lys Ala Gly Val Ala Leu Val Arg Ser Asp Tyr Lys Leu Tyr Asn
370 375 380
Lys Asn Ser Ser Ser Asn Ser Thr Leu Lys Asn Leu Gly Glu His His
385 390 395 400
Arg Ala Arg Ala Met Asp Gly Gly Lys Ala Gly Val Ala Leu Val Arg
405 410 415
Ser Asp Tyr Lys Phe Tyr Glu Asp Ala Asn Gly Thr Arg Asp His Lys
420 425 430
Lys Gly Arg His Thr Ala Arg Thr Ser Arg Ser Asp Tyr Lys Phe Tyr
435 440 445
Asp Asn Lys Arg Ile Asp Ser Thr Ser Gly His His His His His His
450 455 460